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HYDROZOA AND SCYPHOZOA

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ıg the last four months of the Swedish Sea Expedition trawling hauls were made ırteen localities in the Atlantic Ocean at s of more than 4,000 m. Very few benth- hydrozoa and scyphozoa were secured these collections, viz. one thecaphore ›id (*Cryptolarella abyssicola* Allman) in ›cality, and one species of a scyphopolyp *ianoscyphus simplex* Kirkpatrick) which :aken in three localities. Both of them however, of considerable interest, and ı to thank Dr. O. NYBELIN of the Natural ry Museum of Göteborg for placing these ble specimens in my hands for exa- tion.

HYDROZOA

Hydroida thecaphora

Cryptolarella abyssicola (Allman)

Plate, figs. 1—3.

tolaria abyssicola Allman 1888 p. 40, Pl. figs. 2, 2 a.

tolarella abyssicola Stechow 1913 a p. 138; 13 b p. 29.

erial: St. 387 (Haul No. 13), N 40° 33′ 35° 24′—N 40° 34′ W 35° 52′, Sept. 7th 48; depth 4,540—4,600 m.

demonstrated by TOTTON (1930 p. 161) majority of the species formerly referred he genus *Cryptolaria* should bear the ric name *Acryptolaria* Norman 1875. Two es, *Cryptolaria abyssicola* and *diffusa* All- had previously been removed from the s by STECHOW who, in the two papers quoted above (1913), established a new genus, *Cryptolarella*, for these two species with *abyssicola* as the genotype. The genus is distinguished from *Acryptolaria* and *Grammaria* by having the gonothecae placed singly on the stems and branches and not collected into aggregates. STECHOW gives the following diagnosis of the genus *Cryptolarella:* »(Hydrocaulus zusammengesetzt). Theken röhrenförmig, ungedeckelt, sessil, zweizeilig angeordnet, vielfach in den Stamm eingesenkt (von peripheren Tuben teilweise verdeckt). Hypostom konisch. Keine Nematophoren. Gonotheken einzeln, nicht in Form von Scapus oder Coppinia.»

There is one mistake in this diagnosis: the hydrothecae are not placed in two rows. ALLMAN in his description of *C. abyssicola* expressly emphasizes that the hydrothecae are »disposed on all sides of the stem», and further below »The scattered instead of distichous disposition of the hydrothecae is a peculiar, and exceptional character». As seen from his figures, the same applies to *C. diffusa*, and is also evident in the present specimens from the Swedish Deep-Sea Expedition.

ALLMAN's description of *C. abyssicola* is as follows:

»Trophosome. — Hydrocaulus much and very irregularly branched, branches rather slender, flaccid. Hydrothecae disposed on all sides of the stem.

Gonosome. — Gonangia springing at intervals along the stem, and forming long, tubular receptacles, ventricose towards the base, and then tapering to their point of attachment, and terminating distally in a truncated sum-

mit which is occupied by the wide circular orifice.»

It was collected by the »Challenger» expedition, stat. 160, south of Australia, 42° 42′ S, 134° 10′ E, at the considerable depth of 2,600 fathoms (4,755 m).

It has frequently been maintained that ALLMAN's descriptions and figures are not always quite reliable, but the present specimens from the Atlantic Ocean agree so well with the above description of *C. abyssicola* that I feel sure not merely that they belong to the same species, but also, in this case at least, that ALLMAN has given a correct conception of his specimen. One may object to the expression that the colony is much branched; it is not so in his figure (fig. 1), and in this respect the present colony agrees better with the figure than with the description. On the other hand, the branches are certainly »rather slender, flaccid», so that the only disagreement is in the word »much» branched. The great distance between the two localities, in the middle of the Atlantic and in the deep-sea area south of Australia, is no objection to the supposition that the specimens belong to the same species, since within several other groups of marine animals we know that the abyssal species frequently have a very extensive geographical distribution.

Most probably the species has been taken in a third locality. According to the description and figures of the other species of *Cryptolarella*, *Cryptolaria diffusa* Allman (1888 p. 42, Pl. 21 figs. 1, 1 a) these two species are so alike that there can hardly be any doubt that they are identical; I can find no other characteristic difference between them than the gonothecae of *C. diffusa* being »sometimes geminate», two gonothecae being »adherent, back to back, for about three-fourths of their height, the distal fourth being free divergent». ALLMAN himself points out the possibility that this feature is merely an abnormality, as most of the gonothecae in the same colony are single. *C. diffusa* was taken by the enger», stat. 101, in the Atlantic, off Leone in West Africa at a depth o fathoms (4,572 m).

Description of the colony from the Swedish Deep-Sea Exp

The colony is detached from its subst a small stone, however, is attached to the branches by means of the stolonize of some peripheral tubes, which show the colony was taken on the bottom. broken into several pieces, the long which are $2^1/_2$—4 cm in length, rather sp and diffusely branched, the distance b the branches varying between 2 and usually more than 4 mm. The angles b the branches and the stem vary fro to 80°, but are most frequently abo or 60°. The thickest portion of the ste sures 0.7 mm in diameter. In the basa of the stem and principal branches the axial tube is completely surround the peripheral tubes, in the lowermost p in more than one layer. Towards th of the branches the peripheral tubes d in number, but a few of them may reac to the outmost tips of the branchlets (The hydrothecae issue from the axia their basal part is covered by the per tubes which may also sometimes co upwards on the external wall of a hydr (fig. 1, uppermost hydrotheca).

The hydrothecae are long and tubula entire length varying between 1.1 and 1 usually about 1.5 mm; their proximal adnate to the axial tube, somewhat cons at the base and gradually widening t the distal half part, which has near same diameter throughout, varying b 0.165 and 0.195 mm. This distal part hydrotheca curves evenly outwards, son so much that the aperture becomes par

is of the branch, but as a rule the aperpoints obliquely upwards. The aperture pendicular to the longitudinal axis of ydrotheca. The hydrothecae are placed mewhat irregular intervals and they from all sides of the axial tube with a ncy towards formation of three or four udinal rows, but the arrangement is far being regular. The number of hydro- along 10 mm of the branches varies en 12 and 15 and is generally 13 or 14. gonothecae (fig. 3) are large, 2.1—2.7 in length, somewhat inflated, tapering ds the base and, to a less extent, towards istal end. They are adnate to the branch e greater part of their length; the greatest is 0.45—0.65 mm. The distal end is a short, wide tube, more or less outward directed, with a circular opening 0.35—0.40 mm in diameter. The gonothecae are irregularly scattered over the branches of the colony, their distal end usually pointing upwards, but sometimes downwards; they may be situated on any side of the branches; one of the branches carries four gonothecae in close succession. The state of preservation does not permit an examination of the contents of the gonothecae.

The locality is in the deep-sea area N W of the Azores. As mentioned above, the species was previously found in deep water south of Australia and, if *C. diffusa* is identical with *C. abyssicola*, also in the Atlantic off Sierra Leone.

LIST OF HYDROIDS RECORDED FROM DEPTHS OF MORE THAN 3,000 M.

	Atlantic Ocean	Indian Ocean	Pacific Ocean	
tella vermicola (Allman)	—	—	5,304 m	35° 22′ N, 169° 53′ E
tella spongicola Haeckel	—	—	4,206—5,304 m	N. and centr. Pacific.
tella abyssicola Haeckel	—	—	4,206—5,304 m	N. and centr. Pacific
ctinia ingolfi Kramp	2,137—3,229 m	—	—	N. Atlantic.
hiocerianthus imperator (Allman)	—	628—1,019 m	200—5,304 m	Arabian Sea; NW Pacific, Panama.
dea striata (Clarke)	—	—	4,243 m	0° 34′ N, 117° 16′ W
anulina denticulata Clarke	—	—	5,203 m	13° 11.6′ S, 78° 18.3′ W
phonia megalotheca Allman	—	672—4,755 m	—	S. of Australia; E. of St. Paul.
phonia spongicola Haeckel	—	—	4,206—5,304 m	N. and centr. Pacific.
olarella abyssicola (Allman)	4,540—4,600 m	4,755 m	—	N. Atlantic; S. of Australia.
olarella diffusa (Allman)	4,572 m	—	—	W. of Africa.
arella tropica Hartlaub	—	—	150—3,667 m	Japan; E. trop. Pacific.

SCYPHOZOA

Coronata

ephanoscyphus simplex Kirkpatrick

Plate, figs. 4—5.

anoscyphus simplex Kirkpatrick 1890 p. Pl. III fig. 2.

gicola sp. Lo Bianco 1903 p. 269, Pl. 7 . 6.

anoscyphus bianconis Thiel 1936 p. 389, . 199 *f.*

bularia striata Vanhöffen 1910 p. 280, fig. 6.

? *Scyphistoma striatum* Vanhöffen 1910 p. VII, Stechow 1925 p. 518.

partim *Stephanoscyphus striatus* Leloup 1937 p. 64.

The name of *Stephanoscyphus mirabilis* was given by Allman (1874) to a peculiar polyp found on the south coast of France; it had previously been observed (but not named) in other places in the Mediterranean, and it was described again by F. E. Schulze (1877) as *Spongicola fistularis* from the Adriatic; the

polyps formed branched colonies immersed in sponges, and both authors considered it a special form of hydrozoa. The supposition that it was the scyphistoma stage of the coronate medusa *Nausithoë punctata* was advanced by METSCHNIKOFF (1886) and confirmed by LO BIANCO and P. MAYER (1890). Later, several more or less similar polyps were described. As long as *S. mirabilis* is the only species of which the medusa is known, all these species are provisionally classified under the generic name *Stephanoscyphus*. Surveys of the history of *Stephanoscyphus* are given by KOMAI (1935) and THIEL (1936), and a revised list of the species and their distribution, with numerous excellent new figures, is given by LELOUP (1937). The polyps found by the Swedish Deep-Sea Expedition evidently belong to one species; they were taken in the following localities:

Material: St. 357 (Haul No. 6), N 02° 26′ W 39° 26′—N 02° 24′ W 39° 12′, July 26th—27th 1948; depth 4,474—4,430 m: 4 specimens on small pieces of slag.

St. 371 (Haul No. 10), N 24° 12′ W 63° 23′—N 24° 28′ W 63° 18′, Aug. 20th 1948; depth 5,850—5,860 m: 1 specimen on a small stone.

St. 373 (Sledge-trawl), N 28° 25′ W 61° 05′—N 28°05′ W 60° 49′, Aug. 23rd—24th 1948; depth 5,500—5,987 m: 3 specimens on a small stone and a piece of slag.

The first of these localities is situated off the north coast of Brazil, the two others are between the West Indian Islands and the Bermudas (see the map, Text-fig. 1).

Description (Plate, figs. 4—5): The tubes are up to 6 mm long, more or less curved, sometimes S-shaped, very narrow at the base, evenly increasing in width towards the circular aperture which is about 0.8 mm in diameter. The mouth of the tube is more or less damaged in all the specimens, but in one of them part of the margin is retained, showing th smooth, not serrated. The button-li pansion, by which the tube is attached substratum, is circular and about 0.6 diameter. For a short distance from t the tube is irregularly wrinkled, but t out the greater part of its length it is p with densely set, sharp rings, usually wi regular intervals, though minor irregu may occur here and there. In one specimens (from stat. 371) the rings uppermost $1^1/_2$ mm are interrupted by broad, smooth stripe on one side of th In some species of *Stephanoscyphus* t is provided with one or more whorls tinous knobs protruding inwards in cavity of the tube, and such knobs a present in some of the present spe they are invaginations from the exter face of the tube. In one specimen (sta there are four, of unequal size, about below the mouth of the tube; in one specimens from stat. 373 there are different size, opposite each other in the remaining six specimens no tr such internal processes are seen. Thu peculiar structures do not seem to be of importance. A few of the tubes contai crumpled remains of coenosarc in thei part, not sufficient for anatomical exami

The list given by LELOUP comprises species. *S. rugosus* (d'Orbigny 1839 doubtful species, insufficiently described the name of *Tubularia rugosa*. *S. m* Allman 1874, *allmani* Kirkpatrick 189 *racemosus* Komai 1936 form branched c *S. komaii* Leloup 1937 is likewise a form, the tubes issuing from creeping This species, as also *S. allmani*, moreover from the other species by the entirely di shape of the internal chitinous process *S. sibogae* Leloup 1937, which was fou depth of 794 m in the Malayan Archi the tubes are single, attached to the s tum by a small basal disk; they are

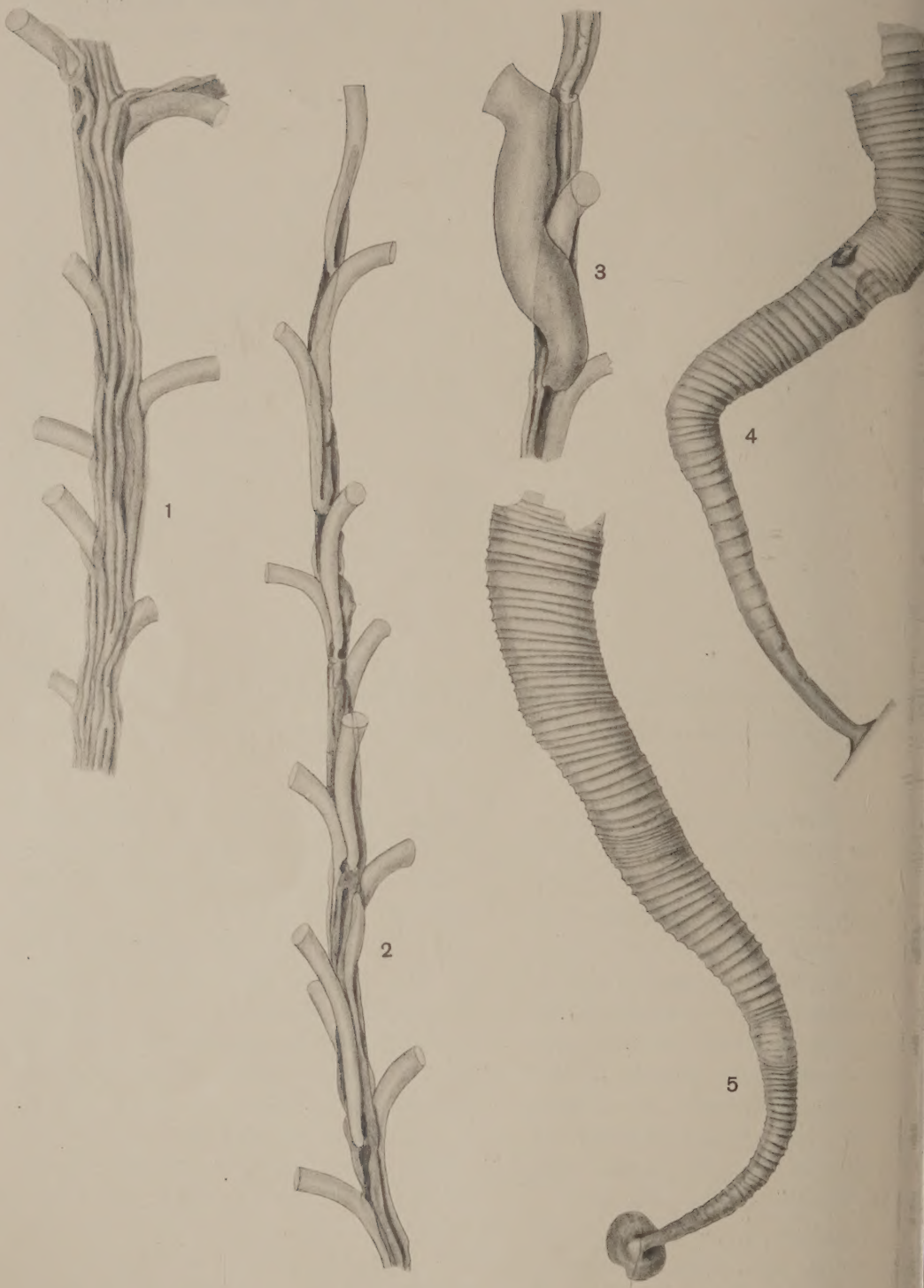
, and in their interior wall there are
l (up to 9) whorls of chitinous processes
ferent levels, with a varying number
›bs (up to 8) in each whorl. *S. corni-*
Komai 1936 is referred by LELOUP to
abilis Allman, but it is very similar to
›gae;* it is a littoral form taken in Japan.
P likewise refers *S. simplex* Kirkpatrick
o *S. mirabilis*. This identification seems
› rather irrelevant. The species was
described and well figured by KIRK-
:K after specimens in the British Museum,
d *S. simplex* by ALLMAN, who, however,
ever published the name, so that KIRK-
:K stands as the author. The specimens
st of single funnel-shaped tubes attached
›bles by a slightly expanded base. The
al chitinous processes in this species
ıemispherical swellings, four being formed
e same plane.» The external wall is
ed with densely set, sharp rings exactly
the specimens collected by the Swedish
Sea Expedition, and I have not the
st doubt that these belong to the same
s. *S. simplex* was taken in deep water,
m, in the North Atlantic, N 56° 11′
41′, S E of the south point of Greenland.
very similar form was found in deep
950—1,000 m, near Capri in Italy and
›ed and figured by LO BIANCO (1903)
ongicola sp., THIEL (1936 p. 389) gave
name *Stephanoscyphus bianconis*. It is
ary polyp with a funnel-shaped, chitinous
10—15 mm long and about 1 mm wide
terminal aperture; it is provided with
ous sharp rings throughout its entire
and attached to shells or hydroids or
by means of a small, button-like basal
sion. It lacks internal processes, but,
ıtioned above, such processes are lacking
ne of the specimens collected by the
sh Deep-Sea Expedition, whereas they are
t in others, so that there is no objection
e supposition that the Mediterranean
belongs to the same species as the At-
lantic deep-sea specimens and should also be named *Stephanoscyphus simplex*.

I am more in doubt about *Stephanoscyphus striatus* (Vanhöffen 1910). It was taken by the German South-polar expedition in deep water, 2,450 m, in the Antarctic Ocean, about 65° S, 85° E, not very far from the antarctic continent, and first mentioned by VANHÖFFEN as *Tubularia striata* n. sp. (p. 280, fig. 6). In the introduction to the same volume of the report from the expedition (p. VII) VANHÖFFEN states that it is a scyphopolyp and not a hydroid. It is characteristic of this author that he gave no description of the species beyond a short remark that the tube is »7.5 mm hoch, fest chitinisiert und von gelbbrauner Farbe», but the figure leaves no doubt about its identity. It was found again by the German deep-sea expedition (»Valdivia») in a locality in the Indian Ocean off the coast of Somali in East Africa, at a depth of 1,079 m, attached to the stem of the hydroid *Cladocarpus distomus* (STECHOW 1925 p. 518). LELOUP refers *S. bianconis* to this species, and he may be right in doing so. They are certainly very much alike, but VANHÖFFEN's figure shows a fine longitudinal striation between the transversal rings, of which no trace is seen in *S. bianconis* nor in the Atlantic deep-sea form. *S. striatus* is also devoid of internal processes.

Though the medusa of only one species of *Stephanoscyphus* is known, we presume that all of them are the polyps of coronate medusae, also the present form, *S. simplex;* but we can only guess to which medusoid species it belongs. In accordance with the decidedly abyssal occurrence of the polyp we may suppose that the medusa is a bathypelagic species. Among the deep-sea medusae known from the Atlantic there are four possibilities: *Nausithoë limpida* Hartlaub, *Nausithoë globifera* Broch, *Periphylla periphylla* (Péron & Lesueur), and *Atolla wyvillei* Haeckel. Of these *Periphylla* is the only species which also occurs

Text-fig. 1. Distribution of *Cryptolarella abyssicola* ●, *C. diffusa* ○, *Stephanoscyphus simplex* ▲, and *St. bia*

in the Mediterranean, so that if the Atlantic polyp, *Stephanoscyphus simplex*, actually is identical with *S. bianconis* from the Gulf of Naples, we might conclude that the corresponding medusa is *Periphylla periphylla*. The connection between this medusa and the polyp from Capri was already suggested by Lo Bianco (1903), because a young *Periphylla* was taken in the neighbourhood, and the presence of a pointed apical prolongation from the stomach of *Periphylla* was believed to indicate that this medusa is derived from a fixed polyp. In a previous paper (Kramp 1947 pp. 42 ff) I discussed the horizontal and vertical distribution of *Periphylla*, and I came to the conclusion (p. 44) that probably »the development is independent of the sea bottom, so that no fixed bottom stage comes into the cycle of development». The po exists, however, that there is a poly attached to pelagic objects. When sp of *Stephanoscyphus bianconis* were no on hydroids or corals, they were f shells of pelagic molluscs, but only shells deposited on the bottom; the never seen on swimming gastropods. former occasion, describing a new parasitic on a pteropod, I examined collection of pteropods, and I never s thing like a scyphopolyp. At present, t I doubt whether *Periphylla* is derive polyps growing on swimming gastropo as mentioned above, the vertical dist of the medusae, especially the your seems to me to contradict the sup that it has a fixed stage attached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n of the ocean; but future investigations solve this problem. The possibility still that the Atlantic deep-sea polyp, *noscyphus simplex*, belongs to one of the bathypelagic species of *Nausithoë* or to an undescribed species of coronate medusae; the pelagic fauna of the great depths below 4,000 m is still almost unknown.

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Explanation of plate

Figs. 1—3. *Cryptolarella abyssicola* (Allman). — × 20.
1. Portion of stem.
2. Terminal end of a branch.
3. Gonotheca.

Figs. 4—5. *Stephanoscyphus simplex* Kirkpatrick. — × 25.
Specimens from St. 373, sledge-trawl.